REMOTE CONTROLLED VEHICLE "WHEELBARROW"

Major Barry Taylor
Army School of Ammunition
Marlborough Barracks
Temple Herdewyke
Leamington Spa, Warwickshire CV33 0UL, U.K

INTRODUCTION

The Army School of Ammunition in Warwickshire, England is the United Kingdom's premier IEDD training establishment. We have been training IEDD operators since about 1922 and most recently our efforts have been centred on the training of individuals for Northern Ireland operations. In addition we also train students from many countries around the world, principally in EOD matters, but also in conventional Land Service Ammunition, which is our main task in the Field Army.

We are currently using and developing two computer-based training systems in the IEDD field. The two systems are:

- RCV Wheelbarrow MK8B Control Trainer System
- IEDD Threat Assessment Trainer

WHEELBARROW MK8B CONTROL TRAINER SYSTEM

Introduction

In 1993 the United Kingdom's prime remote controlled EOD vehicle, *Wheelbarrow* was subjected to a mid-life improvement (MLI). The aim of the MLI was to extend the in-service life of the Wheelbarrow through to the year 2000 whilst development on its replacement took place. This upgrade programme resulted in the complete overhaul of the Wheelbarrow and the introduction of modern electronics technology. Whilst the general appearance of the vehicle did not change its functionality changed considerably. One aspect that did change was the *Hand Controller*. The previous system had been a fairly straightforward unit that was easily adapted to by operators and required very little familiarisation before they became proficient in its use. The replacement was, however, a much more complex system and with each new RCV costing in the region of £100k. In addition, there was a dedicated training requirement for the Hand Controller alone, before we could expose operators to the main vehicle. Of greater importance was the initial timeframe in which the changeover from MK8 to MK8B had to take place. Operational units therefore needed conversion training before they received the new vehicle. Special courses were designed to manage this turbulent period and, over a 6-month period, all IEDD operators from all 3 services in the United Kingdom were converted using this Control Trainer System at the Army School of Ammunition. Anite Systems Ltd. designed the system, initially for the wheelbarrow MK8+, which is an export model.

System Description And Operation

The system was designed primarily to enable operators to become familiar with the functionality of the Hand Controller. To do this we have four control work stations. Each station comprises a standard desktop PC with P75 processor, a 15" monitor, keyboard, mouse and joystick. A standard hand control unit attaches to the processor via an interface box. The software provides 3 separate, but selectable 2D VR environments in which to train. In each training scene a graphical representation of the Wheelbarrow is produced which responds to commands from the Hand Controller with the ability to 'fire' standard IEDD weapons at simulated targets in the same way as the real vehicle. The 'F' keys on the keyboard in conjunction with the joystick allow the operator to move around the scene and also to obtain the classic 'through the camera' view he would get with the Wheelbarrow. The joystick control is independent of the Hand Controller and has no effect on the movement of the vehicle. In each scene there are a number of configuration facilities to add a challenge and variety to the training task. These are:

Street Scene

- 3 incident control point positions

Paper presented at the RTO HFM Workshop on "The Capability of Virtual Reality to Meet Military Requirements", held in Orlando, USA, 5-9 December 1997, and published in RTO MP-54.

- 4 IED types (attaché case, petrol bomb, package and car)
- 3 pre-set IED locations (telephone box, under car and car trunk)
- Manual IED positioning
- 3 drive camera positions

House Scene

- 3 drive camera positions
- 3 IED types (petrol can, bottle and attaché case)
- 5 IED locations (lounge, study, kitchen, bathroom, bedroom)
- Manual IED positioning
- 3 lounge layouts
- Manual furniture positioning
- Door set-up

The Test Track adds a competitive edge to the system and comprises an obstacle course designed to test the operator's control of the vehicle. The obstacles include:

- Railway track
- Stairs
- Uneven roadway
- Steep slopes
- Narrow corridors
- Traffic cones

This is a timed task and a clock begins when the Wheelbarrow crosses the start line. If he should hit a cone it adds 30 seconds to the time. He can not drive through walls to take short cuts!

Benefits To Date

This was the first computer based training system we had into service before the main hardware. There have been a number of obvious advantages so far:

(1) It enabled the MK8B to enter service in a timely and efficient manner with personnel already trained in its use.

(2) It is now a fully established training system, which we use for all new operators who come on courses. It allows repetitive training in a controlled and comfortable environment without the need for heavy instructor commitment, equipment support or a training area.

(3) It has significantly reduced the repair bill to the vehicle fleet.

Future Development

Experience with the Control Trainer System has recognised its limitations. For what it was designed to do it does it very well. There are, however, a number of potential improvements to the system that we have discussed with Anite.

- Improved graphical environment
- A configurable scene generator
- A scenario generator
- The ability to use the full range of IEDD weaponry
- A faults generator

These modifications would provide a much greater variety of more realistic situations and give students a more flexible and testing training system. Ultimately our aspiration is to make this part of a family of a team training system. The prototype system for the ANDROS RCV has many parallels in its concept. There is certainly scope for an exchange of ideas.

IEDD THREAT ASSESSMENT TRAINER

The second computer based training system is the IEDD threat assessment trainer. This is currently a concept demonstrator developed by Westland System Assessment Ltd. in conjunction with Centre for Human Sciences and, unlike the RCV Trainer, concentrates on the 'soft skills' of the IEDD operator.

In any IEDD situation the critical time is generally considered to be the first 10 minutes after arrival at the scene. In a very short space of time the operator must be briefed, establish the safety of the ICP, obtain information through questioning, make an initial assessment of the threat and devise his initial EOD plan and response.

This is no easy task and experience has shown that many operators find this aspect of the task the most difficult to master. We are currently developing a concept demonstrator, which replicates this process and is based on an existing classroom exercise.

System Description And Operation

The current system, which has undergone a number of developments, is based on a desktop multi-medium PC running a P90 processor with 16 MB of RAM and a space mouse. The visualisation software is Superscape Visualiser 4.00 running under MS DOS 6.22. MS-Windows 3.11 is also loaded to run MS-Write for exercise feedback.

The Exercise

On beginning the exercise the student is given the opportunity of working through a tutorial. This is simply designed to teach the student the basic computer skills necessary to use the trainer and an explanation and practice exercise with the virtual world space mouse. All students are required to complete the tutorial at least once before the threat assessment exercise.

On completion of the tutorial the student is presented with a screen which basically sets the scene. He is then given an audio brief that tells him exactly what has happened. The imaginary scenario used is an explosion in Canterbury in southeast England, in which there are a number of casualties. He has been tasked to deal with the problem and arrives at the scene within 15 minutes. As the brief is given, he is presented with a schematic diagram of the scene and once this is completed he is presented with an initial view of the scene from the police control point. His exercise now begins.

To the right and bottom of the screen there are a number of user interaction icons coloured blue when non-active and green once selected. There are also keyboard shortcuts for each icon:

- Schematic map
- Question and Answer
- Vewpoints
- Visualisation
- Decision

The Assessment Session is his final choice. Once he has sufficient information he selects the assessment icon which then questions him on his understanding of the situation. He will answer about 30 questions, most of which only require a mouse click in response. A few will require a typed entry.

On completion of the assessment session, he is presented with a final screen that allows him to walk through the virtual world highlighting important aspects such as cordon positions and security cameras in the area. The second choice is feedback. This displays messages, which will have been triggered by certain selections made in the assessment session, informing where the student has gone wrong or congratulating him on making the correct choices.

Benefits Of An IEDD Threat Assessment Trainer

This aspect of an IEDD task is the most critical. If an operator is able to make an accurate assessment of the problem he is then faced with his render safe plan, which should follow quite logically. His skills with the equipment can only be

perfected by practical training, but we see this as a pre-cursor, in many respects, to his practical training. This interactive demonstrator uses a relatively uncomplicated scenario. There are of course many real situations that have occurred which are far more complex and testing. It follows the methodology of dealing with an IED task taught in the classroom and is a natural extension to this teaching.

FUTURE DEVELOPMENTS

This is only the first hurdle. With an improved graphics environment, a greater selection of scenarios and voice-activated commands instead of keystrokes, we are certain this will become a valuable training tool. It will never replace reality, but it will help develop our professional EOD operators and is another step towards our ultimate team training system.